

**Notice of Allowability**

Application No.

10/804,862

Applicant(s)

XU ET AL.

Examiner

Joni Hsu

Art Unit

2671

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--**

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to papers received November 18, 2005.
2. ☒ The allowed claim(s) is/are 1-30.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some\* c) ☐ None of the:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

\* Certified copies not received: \_\_\_\_\_.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
- (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
- 1) ☐ hereto or 2) ☐ to Paper No./Mail Date \_\_\_\_\_.
- (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date \_\_\_\_\_.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

**Attachment(s)**

- |   |  |
|---|--|
| 1. <input type="checkbox"/> Notice of References Cited (PTO-892)  | 5. <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)            |
| 2. <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                | 6. <input type="checkbox"/> Interview Summary (PTO-413),<br>Paper No./Mail Date _____. |
| 3. <input type="checkbox"/> Information Disclosure Statements (PTO-1449 or PTO/SB/08),<br>Paper No./Mail Date _____ | 7. <input checked="" type="checkbox"/> Examiner's Amendment/Comment                    |
| 4. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit<br>of Biological Material          | 8. <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance   |
|   | 9. <input type="checkbox"/> Other _____.   |

## **DETAILED ACTION**

### ***Response to Amendment***

1. Applicant's arguments, see pages 9-18, filed November 18, 2005, with respect to Claims 1-3, 5, 11, 17, 19, 25-29 have been fully considered and are persuasive. The 35 U.S.C. 103(a) rejections of Claims 1-3, 19, and 25-29 and the objections of Claims 5, 11, and 17 has been withdrawn.

### **EXAMINER'S AMENDMENT**

2. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

3. Authorization for this examiner's amendment was given in a telephone interview with Daniel McClure on January 19, 2006.

4. The application has been amended as follows:

Claim 25 is amended to recite "The computer graphics system of claim 19, further comprising a means for creating a shadow effect using a compressed stencil buffer."

Claims 26-30 are amended to recite "The computer graphics *system* of claim..." instead of "The computer graphics *hardware* of claim..."

*Allowable Subject Matter*

5. Claims 1-30 are allowed.

The following is an examiner's statement of reasons for allowance:

6. The prior art taken singly or in combination do not teach or suggest a plurality of depth buffers, wherein at least one of the plurality of depth buffers is configured to provide depth data for a group of pixels, wherein at least one other of the plurality of depth buffers is configured to provide depth data for each pixel of the group, as recited in Claim 1. Claims 2-10 depend from Claim 1, and therefore also contain allowable subject matter.

The prior art also does not teach that a first portion of the shadow mask data is generated in the compressed stencil buffer and a second portion of the shadow mask data is generated in a pixel stencil buffer, as recited in Claim 11. Claims 12-18 depend from Claim 11, and therefore also contain allowable subject matter.

The prior art also does not teach shadow data compression logic configured to generate a compressed stencil shadow data, where the compressed stencil shadow data corresponds to the group of pixels, wherein the compressed stencil shadow data is generated utilizing a stencil shadow volume method; shadow data generation logic configured to generate an uncompressed stencil shadow data, wherein the uncompressed stencil shadow data is generated utilizing the stencil shadow volume method; and shadow data merging logic configured to selectively merge the compressed stencil shadow data with the uncompressed stencil shadow volume data, as

recited in Claim 19. Claims 20-30 depend from Claim 19, and therefore also contain allowable subject matter.

7. The closest prior art (Everitt US 20040169651A1) teaches an apparatus for use in a computer graphics system [0002], comprising a depth buffer for storing depth data [0009], wherein the depth buffer is configured to provide depth data for a group of pixels [0010]; a plurality of stencil buffers, the stencil buffers configured to store stencil shadow volume data (*stencil buffers can be used to determine the intersection of objects with the shadow volumes, using a stencil buffer to render scenes with shadow volumes is referred to as stenciled shadow volumes*, [0021]), wherein at least one of the plurality of stencil buffers is configured to provide stencil shadow volume data for the group of pixels [0010]; and control logic for controlling the plurality of stencil buffers and the depth buffer, wherein the stencil shadow volume data is generated and stored [0009, 0021]. However, Everitt does not teach a plurality of depth buffers.

8. Another prior art (Sperber US006557083B1) teaches a depth buffer that can store both compressed and uncompressed data at the same time (Col. 5, lines 39-57), wherein the uncompressed depth buffer is configured to provide depth data for each pixel of the group (Col. 10, lines 16-32). However, Sperber does not teach a plurality of depth buffers.

9. Another prior art (Bilodeau US006384822B1) teaches that the stencil buffer is configured to store stencil shadow volume data for each pixel of the group (*stencil buffer on a per-pixel basis, shadow volumes*, Col. 1, lines 52-63). However, Bilodeau does not teach a plurality of depth buffers.

10. Another prior art (Snyder US006252608B1) teaches a method for generating a shadow effect in a computer graphics system (*methods and graphics rendering systems for shadowing*

*images*, Col. 4, lines 30-31), comprising the steps of rendering an object with diffuse color (Col. 30, lines 57-64); generating pixel depth information for a scene for storage in a pixel depth buffer; generating depth information for pixels (*pixel buffer serves as the depth buffer for storing the two closest z values*, Col. 86, lines 21-23), testing the depth information in the depth buffer to determine if the group of pixels may utilize a shadow mask data in a stencil buffer; generating the shadow mask data; generating a shadow area, wherein the shadow area is determined by the shadow mask data contained in the pixel stencil buffer; and adding specular color to objects not in the shadow area (Col. 86, lines 21-24; Col. 4, lines 40-63; Col. 19, lines 35-39; Col. 30, lines 57-64). However, Snyder does not teach that a first portion of the shadow mask data is generated in the compressed stencil buffer and a second portion of the shadow mask data is generated in a pixel stencil buffer.

11. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

#### ***Prior Art of Record***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

1. Everitt (US 20040169651A1) teaches stenciled shadow volume algorithms [0007].
2. Sperber (US006557083B1) teaches a depth buffer that can store both compressed and uncompressed data at the same time (Col. 5, lines 39-57).

3. Bilodeau (US006384822B1) teaches that the stencil buffer is configured to store stencil shadow volume data for each pixel of the group (*stencil buffer on a per-pixel basis, shadow volumes*, Col. 1, lines 52-63).
4. Snyder (US006252608B1) teaches improved methods and graphics rendering systems for shadowing images (Col. 4, lines 30-31).

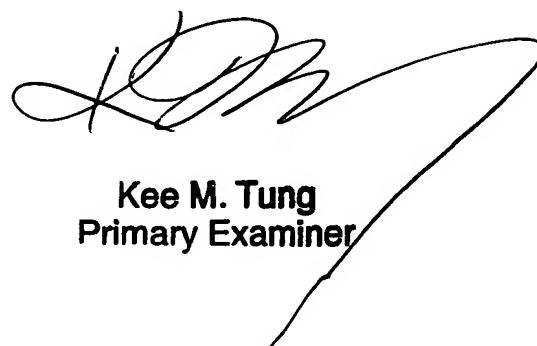
### *Conclusion*

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Joni Hsu whose telephone number is 571-272-7785. The examiner can normally be reached on M-F 8am-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ulka Chauhan can be reached on 571-272-7782. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

JH



**Kee M. Tung**  
Primary Examiner